Department for Business, Energy & Industrial Strategy

ANNEX D

What is NEED?

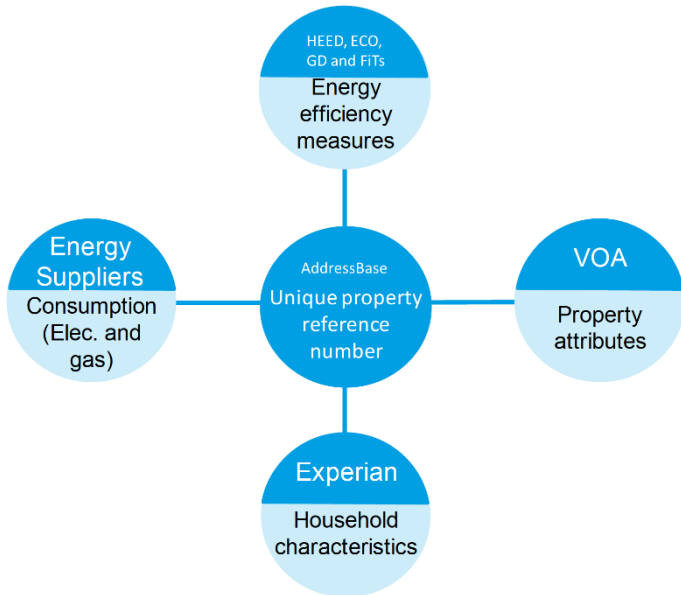June 2018

Department for Business, Energy & Industrial Strategy

Contents

What is NEED?

NEED is a framework for combining data from existing sources (administrative and commercial) to provide insights into how energy is used and what the impact of energy efficiency measures is, for different types of property and household.

The figure above shows how data are combined to form NEED. The address information in each dataset is used to assign a unique property reference number (UPRN) to each record within the dataset. Data from different sources can then be matched to each other via the UPRN. The principle is the same for the domestic and non-domestic sectors, though different data sources are used.

In Scope	Out of Scope
Domestic and non-domestic properties	Very large consumers e.g. power stations
Great Britain	Northern Ireland
Metered Gas and Electricity	Non-metered fuels e.g. oil, coal
BEIS Energy Efficiency Measures data (e.g. HEED)	Measures installed outside of government schemes and DIY measures

Why is NEED important?

NEED provides the largest source of data available for analysis of energy consumption; previous evidence has been derived from surveys and small technical monitoring trials.

NEED forms an important element of BEIS' evidence base and already plays a key role in development and evaluation of BEIS policies, including the Green Deal.

Data in NEED includes:

Domestic	Non-domestic
Energy Suppliers	
• Electricity consumption 2004-2016 • Gas consumption 2004- 2016 • Electricity meter profile class	
VOA	
• Floor area (m^2) • Number of bedrooms • Property type (e.g. terraced) • Property age	• Property description • Property area (m^2) • Car parking • Other additions
Experian	
• Household income • Tenure • Number of adults in household	• Turnover • Employment • Standard industrial classification (SIC) • Premises type
Energy efficiency measures data	
• HEED • Energy Company obligation (ECO) • Green Deal (GD) schemes • Feed-in-Tariffs (FiTs) • Energy efficiency measure installed (Yes/No) • Date measure installed	• None

1. Introduction

The UK has collected and published energy consumption data within the Digest of UK energy Statistics since 1948[1]. This has been produced and published at a national level and is based on aggregate information from energy suppliers. Data relating to domestic energy use has also been published in Energy Consumption in the UK[2]. Whilst these data are still used, the development of UK energy policy has required more detailed data to help deliver and monitor reductions in energy use and emissions.

In 2004 BEIS first started to collect individual meter point data primarily to produce small area consumption data, but by working closely with the energy industry and other key energy efficiency stakeholders, plans were established for a future data architecture suitable for matching the consumption data with additional data sources. The National Energy Efficiency Data-Framework (NEED) is the means by which this has been achieved. Gas and electricity consumption data are matched, at an individual property level, with information about energy efficiency measures installed in households, property attributes and household characteristics.

The Framework was first announced in the Heat and Energy Saving Strategy[3] in 2009 and was developed by BEIS, with support from the Energy Saving Trust (EST) and gas and electricity suppliers, in order to assist BEIS in its business plan priority to "save energy with the Green Deal and support vulnerable consumers". It forms a key element of BEIS' evidence base supporting BEIS to:

- develop, monitor and evaluate key policies (including the Green Deal)
- identify energy efficiency potential which sits outside the current policy framework
- develop a greater understanding of the drivers of energy consumption
- gain a deeper understanding of the impacts of energy efficiency measures for households

The data framework provides the largest source of data available for analysis of consumption and impacts of energy efficiency measures. Previously BEIS has relied on evidence from surveys and small technical monitoring trials. The first results from the framework were published in June 2011, as a pilot to test the framework approach worked. It demonstrated the value of NEED and its importance to BEIS and a wider group of stakeholders, and as a result of this further work has been undertaken, enabling BEIS to update and expand on previous work.

2. The framework

At the core of NEED is the AddressBase[4]. Each record within the AddressBase has a Unique Property Reference Number (UPRN) which provides a reference key to join related address

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[1] https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/digest-of-uk-energy-statistics-dukes

[2] https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/energy-consumption-in-the-uk

[3] https://www.gov.uk/government/publications/heat-and-energy-saving-strategy-consultation

[4] https://www.ordnancesurvey.co.uk/business-and-government/products/addressbase-products.html

records across different datasets. Even if a property is demolished, the UPRN can never be reused and retains its historical information.

Datasets are combined within the framework using the UPRN as a spine. Address data from each of the datasets included in NEED is matched with the address information from AddressBase and used to assign the UPRN to each record within that dataset. The UPRN is then used to link records from one dataset to the corresponding record in each of the other datasets. The diagram below shows how this works for the core data used for domestic analysis. The principle is the same for the domestic and non-domestic sectors though different data are used.

Further information on all the datasets used in NEED can be found in Appendix 1 of this document.

Figure 1: How NEED works
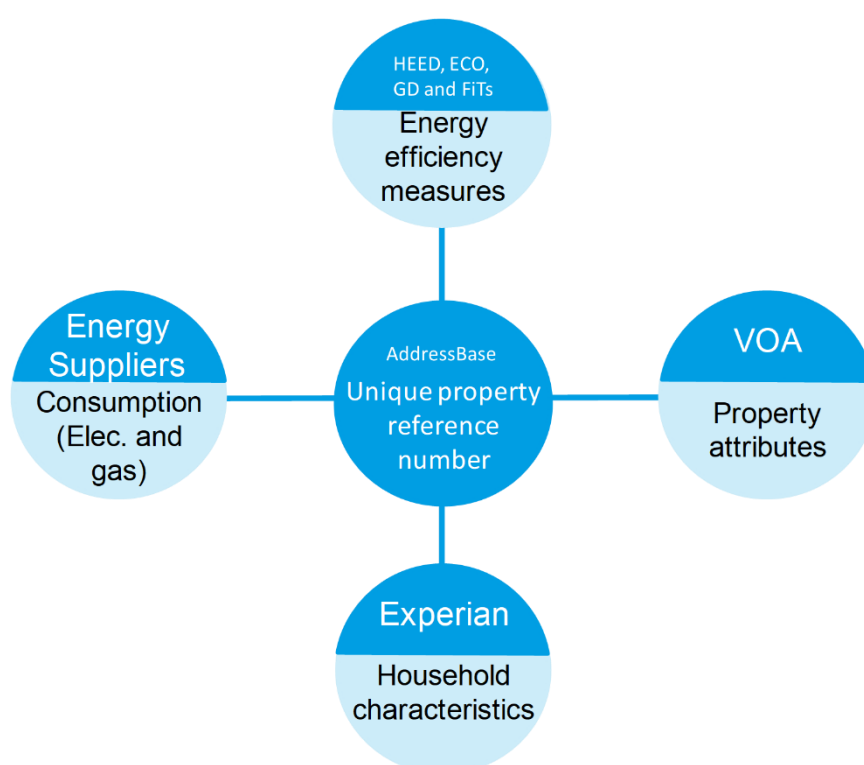
By using this approach to bring together existing data, it offers a cost-effective solution enabling BEIS to undertake detailed analysis of the impact of energy efficiency measures and gain a better understanding of how energy is consumed.

3. Scope

Data in NEED cover the domestic (or residential) and non-domestic (commercial/industrial) sectors across the whole of Great Britain. It includes information on metered gas and electricity consumption for all properties in Great Britain as well as information on energy efficiency measures installed in the domestic sector. Table 1 summarizes the scope of data in NEED, at the high level.

Table 1: Scope of NEED

In Scope	Out of Scope
Domestic and non-domestic properties	Very large consumers e.g. power stations
Great Britain[5]	Northern Ireland
Metered Gas and Electricity	Non-metered fuels e.g. oil, coal
BEIS Energy Efficiency Measures data (e.g. HEED)	Measures installed outside of government schemes and DIY measures

4. Data protection

NEED is constructed to ensure it is compliant with the Data Protection Act. Data in NEED are gathered from a variety of sources including publicly available data and through commercial licences, voluntary agreements and service level agreements with owners of datasets. As part of these agreements and to ensure no individual property or energy supplier can be identified only aggregate results are published. In line with this, all outputs of analysis from NEED are based on a minimum of 30 observations for each result quoted; any results based on fewer than 30 properties are suppressed. More information on data protection is available in the NEED Privacy Impact Assessment[6].

5. Data in NEED

Table 2 below provides a summary of data used to form NEED. Further details on the quality of the data set out in Annex A of the NEED report.

Table 2: Data in NEED

Category	Source	Description
Premises	AddressBase	Contains a unique identifier for each address in England, Wales and Scotland which acts as the spine of NEED.
Energy consumption	Energy suppliers and Xoserve/Gemserv	Gas and electricity meter consumption data for all domestic and non-domestic meters in GB, 2004 – 2016 and meter profile number for electricity meters. Gas data are weather corrected.

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[5] Only England and Wales are included within the scope of analysis of the domestic sector in the main NEED 2018 report (England and Wales for the non-domestic sector) though data for all of Great Britain are available for a number of variables.

[6] Available on the Government website: https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/national-energy-efficiency-data-need-framework.

Category	Source	Description
Measures installed	Homes Energy Efficiency Database (HEED) Energy Company Obligation Green Deal schemes Feed-in Tariffs (FITs)	Information on energy efficiency measures installed through government schemes (including Green deal communities, EEC, CERT and CESP[7]).
Property attributes	Valuation Office Agency (VOA)	VOA is an executive agency of HM Revenue and Customs responsible for business rates and council tax. They collect property detail data to inform this function. The data include floor area (domestic and non-domestic), property type and property age (domestic only).
	Experian	Modelled data for domestic property attributes such as number of bedrooms, property age and type.
	HEED	Includes wall construction and property type, but accuracy and coverage vary.
Households characteristics	Output Area Classification (OAC)	Categorises geographic areas each containing approximately 125 households into 21 socio-economic groups, based on the 2001 census.
Business characteristics	Experian	Information for non-domestic properties, including; turnover, employment and standard industrial classification (SIC) code. Quality and coverage varies.

6. Creating an analytical dataset

Matching

In order to update NEED each component dataset was matched to the Ordnance Survey AddressBase UPRN. The table below shows the match rates for England and Wales for each of the datasets in 2018.

Table 3: Matching statistics at building level (sub-building[8] match rates in brackets)

Data source	Match rate to AddressBase (%)	
Electricity consumption	97	(89)
Gas consumption	100	(94)
VOA property attribute data	100	
Experian	90	
Central Feed-in Tariff Register	97	
ECO measures	97	
HEED	94	
Green Deal measures	90	

The match rates set out in the table are calculated based on the number of records for each relevant source, not the number of UPRNs in England and Wales. For example, not all properties have a gas meter; the match rate shows how many of the properties with a gas meter could be matched to the AddressBase.

Selecting a sample

In order to help data confidentiality, increase processing speeds and reduce cost it was decided that a sample would be used for analysis of the domestic sector. The aim was to create a representative sample which would be suitable for analysis. Data on the Valuation Office Agency database was used to draw a representative sample.

Approximately four million records (17 per cent of the VOA population for England and Wales) were drawn from the VOA database; this number was selected to allow results to be representative at the breakdowns required. Four variables were used to ensure the sample was representative; local authority, property type, number of bedrooms and age of property. A uniform random sample was drawn from each category. More detail about the distribution and representativeness of the sample is provided in Annex A of the NEED 2018 publication.

The final step in creating an analytical file was to match the data from all sources together using the AddressBase UPRN.

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[8] Sub-buildings are properties within another building such as flats within a converted house, or individual units within shopping centre.

For the NEED analysis on properties in Scotland, AddressBase was used as the spine to assign UPRNs to Scottish properties in order to join the Scottish NEED dataset onto other data sources for analysis. In 2018 consumption data, HEED, Home Energy Efficiency Programmes[9] (HEEPS), Warmer homes Scotland, Scottish Assessor data (Property Type, Floor area) and Experian data (Beds, Age, Tenure, Income, Adults, Bungalow property type) were joined to form the Scottish NEED sample.

7. Uses of NEED

NEED has already supported a number of BEIS policies with important consequences:

- NEED has been used to understand the reduction in consumption (and resulting reduction in energy bills) for households installing energy efficiency measures;

- The estimates from impact of measures analysis from NEED were used to inform "in use factors" for the Green Deal;

- NEED has also had a smaller, but still significant, part to play in a range of other BEIS policies, for example, the Renewable Heat Incentive and Fuel Poverty. Data on consumption by property attributes, including the distribution of households' consumption, has been used to help BEIS understand the likely under or over payment if payments for the renewable heat incentive were to be based solely on property attributes available in NEED;

- NEED has helped Fuel Poverty analysis to better understand the actual consumption for different types of properties and households, and therefore to better understand how policy options will impact on different households. Having this information enables BEIS to provide better value for money and understand the impacts of policy options better, for both BEIS and consumers;

- NEED has also helped BEIS understand where further research should be focused. It provides high level results which have highlighted a need for further investigation. For example, further investigation was carried out to understand why households which appear the same in physical property attributes use varying amounts of energy. For more information, go to https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/437099/Annex_C_Change_of_occupancy_analysis.pdf

An anonymised record level NEED dataset, that users can access and interrogate themselves, was published on 29 May 2014. It is anticipated this will increase the use of NEED as a result of enabling analysis by other individuals and organisations.

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[9] http://www.energysavingtrust.org.uk/scotland/grants-loans/heeps

Appendix 1: Data in NEED

AddressBase[10]

AddressBase is the brand name for the compilation of local authority Addressing Datasets managed by Ordnance Survey. AddressBase matches 28 million Royal Mail postal address file records to local authority unique property reference numbers (UPRN), it is a vector address dataset that includes the UPRN, PAF UDPRN, and business/residential classification.

AddressBase is updated on a continual basis providing comprehensive coverage of all addresses in England and Wales. The Local Land and Property Gazetteer (LLPG) and Local Street Gazetteer (LSGs) remain with the creating authority, who will provide updates to the single address gazetteer database, as they do for the National Land and Property Gazetteer (NLPG) and National Street Gazetteer (NSG).

The data is created and maintained at local level to an agreed methodology under the LLPG data entry conventions document (DEC-NLPG), and passed to the hub which tests its structural conformance to the agreed implementation of BS7666. The hub also checks the quality through a regular data audit against third party national address datasets such as the Valuation Office Agency's Council Tax and Non Domestic Rates lists of addresses.

In AddressBase each record has a Unique Property Reference Number (UPRN) which provides a reference key to join related address records across different datasets. Even if a property is demolished, the UPRN can never be reused and retains its historical information.

AddressBase also includes information for Scotland and will has also been used as the spine for the Scottish NEED analysis in 2018.

Postcodes that straddle two geographic areas will be assigned to the area where the mean grid reference of all the addresses within the postcode falls.

Energy consumption meter data

BEIS has collated and analysed property level electricity and gas consumption data since 2004 for the purpose of producing aggregate statistics at sub-national level. BEIS publish these data at the Middle Layer Super Output Area (MSOA) and Lower Layer Super Output Area (LSOA). These are both UK Census based areas. BEIS also has a agreements in place with suppliers to use meter point gas and electricity consumption data in NEED.

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[10] https://www.ordnancesurvey.co.uk/business-and-government/products/addressbase.html

The analysis in this report uses gas and electricity meter consumption data from 2004 to 2016. Analysis primarily focuses on the domestic sector in England, but consumption data are for all domestic and non-domestic meters in Great Britain are supplied to BEIS - around 30 million electricity meters and 24 million gas meters.

Data are obtained from the existing administrative systems of the energy companies and provided by the data aggregators. Electricity data are provided by data aggregators who provide meter point consumption information. Gemserv provide the addresses for each meter point administration number (MPAN). Gas data are aggregated by Xoserve and a number of independent gas transporters for each meter point reference number or gas meter (MPRN).

Xoserve provide annualised estimates of consumption for all the MPRN's based on an Xoserve provide annualised estimates of consumption for all the MPRN's based on an Annual Quantity (AQ). An AQ is an estimate of annualised consumption using consumption recorded between two meter readings at least six months apart. The estimate is then adjusted to reflect "seasonal normal weather conditions", a typical years' weather taken as the average of multiple years. More information on this can be found in The overview of weather correction of gas industry consumption data[11].

For electricity, annualised estimates are based on either an annualised advance (AA) or estimated annual consumption (EAC). The AA is an estimate of annualised consumption based on consumption recorded between two meter readings. In comparison an EAC is used where two meter readings are not available and an estimate of annualised consumption is produced by the energy company using historical information and the profile information relating to the meter. These annualised estimates provide a good approximation of consumption, but do not cover exactly the calendar year. For example, 2016 annualised consumption estimates cover the 365 days up to 30 January 2017.

Further information on these data including the data production methodology and the quality of the data are available in Annex A of the NEED 2018 publication.

Homes Energy Efficiency Database (HEED)

HEED is a national database developed by the Energy Saving Trust. It was set up to help monitor and target carbon reduction and fuel poverty work. It contains details of energy efficiency and micro-generation installations such as cavity wall insulation and solar hot water, including the date of installation. Data have been recorded in HEED since 1995 including activity reported from Government programmes, such as the Energy Efficiency Commitment (EEC) and Carbon Emissions Reduction Target (CERT), and activity reported

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[11] https://www.gov.uk/government/publications/overview-of-weather-correction-of-gas-industry-consumption-data

by trade associations such as Gas Safe and FENSA. Approximately 50 per cent of UK homes have a record in HEED[12].

Homes Energy Efficiency Programmes[13] (HEEPs)

The Home Energy Efficiency Programmes for Scotland (HEEPS) are the Scottish Government's flagship delivery vehicles for tackling fuel poverty and improving the energy efficiency of the domestic housing stock. Launched in April 2013 HEEPS provide an offer of support to households across Scotland. The 2014/15 Programme had a total budget of £94m and funded a number of programmes, including advice and support.

Energy Company Obligation and Green Deal

The Energy Company Obligation (ECO) and Green Deal (GD) are Government energy efficiency schemes which began operating in 2013[14]. They replaced the previous schemes: Carbon Emissions Reduction Target, Community Energy Saving Programme and Warm Front. Their aim is to encourage the uptake of energy efficiency measures so that the efficiency of the building stock is improved. This has impacts such as reduced consumer bills and increased comfort in the home.

Central Feed-in Tariff register

BEIS introduced the Feed-in Tariff[15] (FIT) scheme in April 2010 to promote the deployment of a range of small-scale low-carbon electricity generation technologies in Great Britain.

The FIT scheme subsidises solar PV, hydro, wind, anaerobic digestion installations below 5 MW, and micro combined heat and power below 2 kW. Microgenerators receive guaranteed payments from electricity suppliers based on the amount of electricity produced, along with export tariffs for electricity not used on-site but fed ('exported') to the grid. Unless the microgenerator installs a second electricity meter specifically for exports, 50 per cent of the electricity generated is deemed to be used on-site, and the other 50 per cent, exported to the grid, and export payments are made accordingly.

Valuation Office Agency Council Tax data

The Valuation Office Agency (VOA) are responsible for allocating homes in England and Wales to the appropriate Council Tax band. In order to do this it maintains a property database covering all properties in England and Wales. It includes information on the age

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[12] There are records for approximately 50 per cent of homes in the UK, however there may not be full information for each of these records. There is no information on measures that a household has installed itself (DIY) or measures installed in the home when they were built.

[13] http://www.energysavingtrust.org.uk/scotland/grants-loans/heeps

[14] For more detail on ECO and GD see Annex A (page 34) of the household energy efficiency annual report: https://www.gov.uk/government/statistics/household-energy-efficiency-national-statistics-detailed-report-2017

[15] Further information on the Central Feed-in Tariff register can be found via this webpage: https://www.gov.uk/government/statistical-data-sets/monthly-central-feed-in-tariff-register-statistics

of dwelling, dwelling type, number of bedrooms and floor area. Further information about the data and statistical publications relating to these data are available on the VOA website: http://www.voa.gov.uk/corporate/Publications/statistics.html.

Valuation Office Agency Non-domestic Rates
The VOA are also responsible for valuing business premises for the purpose of charging Business Rates in England and Wales. Information available from this database includes type of premises (e.g. office, shop, place of worship) and floor area.

Experian – domestic data
Experian is a commercial organisation which produces modelled data of household characteristics at address level. Variables include income group, number of adults and tenure. The Experian model derives these variables for each address using data from a range of sources including Census outputs and Experian's consumer survey. BEIS purchased data for the UK. A quality assessment of these data is provided in Annex A of NEED 2018.

Experian – non-domestic data
The Experian non-domestic file is compiled from a variety of business registers and provides address level information about the occupying business. Variables include turnover, employment and business sector (e.g. Standard Industrial Classification (SIC) code and Thomson Directory code).